

# PATENT COOPERATION TREATY

From the:  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

24 MAR 2006

To:  
  
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**PCT**

NOTIFICATION OF TRANSMITTAL OF  
INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Rule 71.1)

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Applicant's or agent's file reference  
FP2554/MM

**IMPORTANT NOTIFICATION**

International application No.  
**PCT/SG2005/000063**

International filing date (day/month/year)  
1 March 2005

Priority date (day/month/year)  
4 March 2004


Applicant

AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.
4. **REMINDER**  
  
The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).  
  
Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.  
  
For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide*.  
  
The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

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It is an object of the invention to provide medical apparatus which can assist the specialist in such a procedure.

- 5 It is another object of the invention to provide medical apparatus which can be used in a simulation procedure for training of such specialists.

SUMMARY OF THE INVENTION

According to an aspect of the invention, there is provided haptic feedback apparatus comprising force application means arranged to apply a force to an elongate intervention device, control means arranged to control the force applied to the  
5 intervention device by the force application means, the control means being connected to at least one sensor arranged to sense a remote force on the intervention device and the control means being arranged to calculate the applied force in accordance with the remote force, the applied force being an amplification of the remote force. The force application means comprises a resilient member arranged to apply the said force to the  
10 intervention device. The haptic feedback apparatus further comprises a sensor arranged to detect frictional force between the resilient member and the intervention device. The detected frictional force may then be used to control the amount of applied force.

Preferably, the force application means applies both an axial and a radial force to the  
15 catheter.

CLAIMS

1. Haptic feedback apparatus comprising:  
force application means arranged to apply a force to an elongate intervention  
5 device,  
control means arranged to control the force applied to the intervention device by  
the force application means, the control means being connected to at least one sensor  
arranged to sense a remote force on the intervention device and the control means being  
arranged to calculate the applied force in accordance with the remote force, the applied  
10 force being an amplification of the remote force,  
wherein the force application means comprises a resilient member arranged to  
apply the said force to the intervention device, and  
wherein the apparatus further comprises a sensor arranged to detect frictional  
force between the resilient member and the intervention device.  
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2. Haptic feedback apparatus according to claim 1, wherein the detected frictional  
force is used to control the amount of applied force.
3. Haptic feedback apparatus according to claim 1 or claim 2, further comprising  
20 means for tracking the rotational movement of the intervention device.
4. Haptic feedback apparatus according to any one of claims 1 to 3, further  
comprising means for tracking the linear movement of the intervention device.

5. Haptic feedback apparatus according to any one of claims 1 to 4, further comprising means for comparing the remote force with a reference force.
6. Haptic feedback apparatus according to any one of claims 1 to 5, wherein the  
5 intervention device is suitable for insertion into a simulated human model.
7. Haptic feedback apparatus according to claim 6, wherein the remote force is generated using computer simulation.
- 10 8. Haptic feedback apparatus according to any one of claims 1 to 7, wherein the intervention device is operable to be inserted into a human subject.
9. Haptic feedback apparatus according to any one of claims 1 to 8, wherein the at  
least one sensor is disposed near or at a tip of the intervention device.
- 15 10. Haptic feedback apparatus according to any one of claims 1 to 9, further comprising a plurality of sensors disposed along the length of the intervention device and the control means is connected to each of the plurality of sensors.